

Remarks

The Office Action dated December 17, 2007 has been carefully considered. Claims 12-27 are canceled without prejudice pursuant to a Restriction Requirement referred to in the present Office Action. Claim 1 is amended without the addition of new matter. Favorable reconsideration of the current claims is respectfully requested.

Claim Rejections

In the Office Action, claims 1-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 has been amended to clarify starting mixture components. Withdrawal of this rejection is respectfully requested.

In the Office Action, claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 3,663,375 to Witheford (Witheford) in view of U.S. Patent No. 5,831,124 to Machhammer et al. (Machhammer). This is based on the Examiner's interpretation that Witheford teaches the generation of two immiscible phases composed of an aqueous sodium sulfate solution and of a methacrylic acid solution that are separated by gravity, whereas Machhammer teaches the use of crystallization technology for the separation of methacrylic acid from two phases.

It is well known to those skilled in the art of making acrylic or methacrylic acid that any thermal exposition during the purification of mostly acidic reactive acidic monomers such as acrylic or methacrylic acid results in the formation of undesirable dimers and oligomers of the monomers. Since these dimers and oligomers have detrimental effects on the further processing

into polymeric products, it is important that the monomers should be thermally stressed as little as possible during any purification step. Due to its relevance, this problem has already been disclosed in the present specification (specification page 3/32, lines 7-10 and lines 19-21; and page 4/32, lines 16-18).

The combined teachings of Witheford and Machhammer do not lead to the invention set forth in the present claims. To the contrary, the combined teaching of Witheford and Machhammer is rather misdirecting for the following reasons.

Witheford discloses a process for purifying methacrylic acid by way of formation of two phases based on a salting-out process. However, Witheford does not disclose or teach the lowering of the temperature of the phase system that causes the formation of a product crystal that can be isolated as set forth in current claim 1, steps (d), (e), and (f).

The Machhammer reference provides a process for the purification of acrylic acid or methacrylic acid by means of two separation processes: a) a “sharply” defined separation process; and b) a “less sharply” defined separation process (col 2, lines 19-34), wherein, most importantly, step (II) makes use of a high-boiling solvent and step (III) is characterized by a distillation process (col 2, lines 44-46). Since the “less sharply” defined separation process being the absorption of stage (II) and/or the distillation of stage (III) both steps (II) and (III) make use of high temperatures for the appropriate separation processes. Thus, Machhammer teaches the use of high temperatures that facilitate the formation of dimers and oligomers from the acidic monomers.

Machhammer explicitly teaches “[i]n stage (II), the acrylic acid and part of the cocomponents are separated from the reaction gas by absorption with a high-boiling solvent. Suitable solvents for this purpose are all high-boiling solvents, in particular solvents having a boiling point above 160°C.” (col 5, lines 43-47). From the teaching of Machhammer, it is clear that by using temperatures above 160°C, dimers or oligomers are formed.

Machhammer further discloses “[i]n process stage (III), the acrylic acid together with the intermediate-boiling components and remaining residue of low-boiling cocomponents is separated from the solvent. This separation is carried out by means of distillation, with any distillation column being able to be used in principle.” (col 6, line 6 – line 7 line 2) Thus, by teaching the use of any distillation, a second procedural step is disclosed that requires heat and additionally causes dimers and/or oligomers to form from the monomers.

Furthermore, Machhammer also discloses “[t]he acrylic acid is separated from the crude acrylic acid from stage (III) by means of dynamic crystallization or a combination of dynamic and static crystallization, with the resulting mother liquor (residue phase) not being discarded but being recirculated at least partially to the absorption stage (II) or distillation stage (III).” (col 7, lines 44-49) In other words, by using the recirculation technique, the monomer containing mother liquor is exposed to the two high temperature stages (II) and (III) and, as a consequence, there is an additional third event that facilitates the formation of undesired dimers or oligomers from the appropriate monomers.

From the above, it can be seen that there is a fundamental difference between the invention as set forth in the present claims 1-11 and Witheford in view of Machhammer, since none of the present claims make use of the disclosure as set forth above to use a high boiling

solvent having a boiling point above 160°C (Machhammer stage (II)) and to use a high temperature distillation for the separation of intermediate-boiling components from the solvent (Machhammer, stage (III)) and to recirculate the mother liquor to the high temperature stages (II) and (III). Accordingly, the combined teachings of Witheford and Machhammer cannot make the invention of present claims 1-11 obvious, but teaches away from lowering of the temperature of the phase system as taught by the present claims. Withdrawal of the rejection of claims 1-11 under 35 U.S.C. 103(a) as being unpatentable over Witheford in view of Machhammer is respectfully requested.

Conclusion

In light of the amendments and remarks presented herein, Applicants submit that the present application is in condition for allowance, and such action is respectfully requested. If, however, any issues remain unresolved, the Examiner is invited to telephone Applicants' counsel at the number provided below.

Respectfully submitted,

/Philip P. McCann/

Philip P. McCann
Registration No. 30,919
SMITH MOORE LLP
P.O. Box 21927
Greensboro, NC 27420
(336) 378-5302
phil.mccann@smithmoorelaw.com

Date: April 16, 2008

File No.: 5003073.066US1